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# The Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order

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## 6.2 Environmental Statement: Volume II: Chapter 5. Carbon

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Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009


*PINS Reference Number:* TR010015

*Document Reference:* 6.2

*Regulation Number:* 5(2)(a)

*Author:* Mott MacDonald

Revision	Date	Description
0	8 <sup>th</sup> January 2014	Revision For Submission

Mott MacDonald Internal Audit			
 Mott MacDonald			
Revision	Originator	Checked By	Approved By
0	J Nichols M O'Brien	J Fookes	G Hewson G Kelly

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*This document is submitted in relation to the application for a proposed development by Norfolk County Council to the Planning Inspectorate, under the Planning Act 2008.*

*The application is for the Norfolk County Council (Norwich Northern Distributor Road (A1067 to A47(T))) Order, to grant development consent for the construction of a new highway running west-east between the A1067 Fakenham Road and the A47 Trunk Road at Postwick, including improvements to the existing highway network to the north and north east of Norwich.*

*This document comprises part of the application documents and relates to Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.*

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## A. Study Area and Tables

### A.1 Study Area

A.1.1 The study area for roads considered in the assessment is presented in MMD-233906-DT-0990 in this Appendix. This presents the links that are within the Wider Network, and within the Fully Modelled Area.

### A.2 Local Authority Emissions Projections

A.2.1 Projections of carbon emissions at the Local Authority level have been made and used to provide context for the assessment. There is no specific obligation for Local Authorities to reduce carbon emissions as the targets are applicable at the national level only. However, estimates have been made of what Local Authority emissions could be in future if they follow the trajectory of national emissions reductions.

A.2.2 The projections have been made using data from DECC's "Updated Energy and Emissions Projections" (2013) to calculate the rates at which emissions are projected to change between milestone years. The same trend has then been applied to combined emissions of Broadland, North Norfolk and Norwich.

Table 1.1: DECC Projected UK emissions (MtCO<sub>2</sub>) (Source: DECC Updated Energy and Emissions Projections 2013).

Year	DECC Projection	Interpolation
1990	773	
2010	592	
2011		579
2012		566
2013		552
2014		539
2015	526	526

Year	DECC Projection	Interpolation
2016		508
2017		490
2018		472
2019		454
2020	436	436
2021		432
2022		429
2023		425
2024		422
2025	418	418
2026		414
2027		409
2028		405
2029		400
2030	396	396
2031		392
2032		387

A.2.3 Based on the interpolation, the following ratios can be determined:

- Ratio for 2017:2011            0.85
- Ratio for 2032:2011           0.67

A.2.4 These ratios have then been used to determine the nominal Local Authority emissions in the three assessment years.

Table 1.2: Calculated projected Local Authority Emissions for Broadland, Norwich, North Norfolk.

Year	2011	2017	2032
ktCO <sub>2</sub> e	2,473	2,094	1,654

### A.3 Assumptions for Electric Vehicles

A.3.1 As described in the methodology in Volume 1 (Chapter 5. Carbon), the assessment of road transport emissions includes assumptions on the uptake of electric vehicles. This adjustment has been included explicitly, since the Emission Factor Toolkit used to calculate road transport emissions does not include electric vehicles.

A.3.2 Adjustments for electric vehicles are based on the approach set out in the DfTs WebTAG units 3.3.5 and 3.5.6. The assumptions are set out in the following tables.

Table 1.3: Electric vehicle energy use, kWh per km (Source: WebTAG 3.5.6, Table 10)

Year	kWh/km
2011	0.1256

Table 1.4: Proportion of vehicle kilometres using electricity (cars) (Source: WebTAG 3.5.6, Table 12)

Year	2015	2020	2025	2030
vkm	0.16%	0.96%	2.54%	5.31%

Table 1.5: Change in fuel efficiency for electric vehicles (Source: WebTAG 3.5.6, Table 13)

<b>Year</b>	2010-15	2015-20	2020-25	2025-30	2030-35
<b>% per year</b>	0.11	-0.31	-0.71	-1.19	-0.26

Table 1.6: Emission factor for electricity (Source: WebTAG 3.3.5, Table 1)

<b>Year</b>	<b>kg CO<sub>2</sub>/kWh</b>
<b>2010</b>	0.3735
<b>2011</b>	0.3735
<b>2012</b>	0.3735
<b>2013</b>	0.3735
<b>2014</b>	0.3735
<b>2015</b>	0.3735
<b>2016</b>	0.3735
<b>2017</b>	0.3735
<b>2018</b>	0.3735
<b>2019</b>	0.3735
<b>2020</b>	0.3735
<b>2021</b>	0.3735
<b>2022</b>	0.3735
<b>2023</b>	0.3735
<b>2024</b>	0.3735
<b>2025</b>	0.3735



<b>Year</b>	<b>kg CO<sub>2</sub>/kWh</b>
<b>2026</b>	0.3510
<b>2027</b>	0.3286
<b>2028</b>	0.3061
<b>2029</b>	0.2836
<b>2030</b>	0.2612
<b>2031</b>	0.2387
<b>2032</b>	0.2162
<b>2033</b>	0.1938
<b>2034</b>	0.1713
<b>2035</b>	0.1488
<b>2036</b>	0.1264
<b>2037</b>	0.1039
<b>2038</b>	0.0814
<b>2039</b>	0.0590
<b>2040</b>	0.0365
<b>2041</b>	0.0351
<b>2042</b>	0.0337
<b>2043</b>	0.0323
<b>2044</b>	0.0309
<b>2045</b>	0.0296
<b>2046</b>	0.0282
<b>2047</b>	0.0268
<b>2048</b>	0.0254

Year	kg CO <sub>2</sub> /kWh
<b>2049</b>	0.0240
<b>2050 onwards</b>	0.0226

## A.4 Individual Year Results

A.4.1 Based on the methodology set out in Volume 1 (Chapter 5. Carbon), the following table presents the calculated carbon emissions for the assessment years considered. The modelled years are highlighted in bold. All other years are interpolated. Un-rounded figures are presented for the purpose of completeness only. The 'change' values continue to decline after 2032 because the electric vehicle component has declining emissions per kWh of electricity generation until 2050 (see Table 1.6 in Section 1.3).

Table 1.7: Calculated annual emissions, tCO<sub>2</sub>

	Wider Network			Fully Modelled Area		
Year	Without Scheme	With Scheme	Change	Without Scheme	With Scheme	Change
<b>2017</b>	1,103,356	1,116,588	13,232	351,381	364,803	13,422
2018	1,114,175	1,127,757	13,582	353,749	367,508	13,759
2019	1,124,984	1,138,914	13,930	356,113	370,209	14,096
2020	1,135,774	1,150,052	14,278	358,470	372,902	14,432
2021	1,145,844	1,160,453	14,609	360,517	375,269	14,751
2022	1,155,887	1,170,825	14,938	362,556	377,625	15,069
2023	1,165,902	1,181,168	15,266	364,585	379,971	15,386
2024	1,175,889	1,191,481	15,592	366,605	382,306	15,701
2025	1,185,775	1,201,691	15,915	368,588	384,602	16,014
2026	1,194,049	1,210,250	16,201	369,907	386,196	16,290

	Wider Network			Fully Modelled Area		
Year	Without Scheme	With Scheme	Change	Without Scheme	With Scheme	Change
2027	1,202,094	1,218,575	16,481	371,143	387,703	16,560
2028	1,209,908	1,226,662	16,754	372,297	389,121	16,824
2029	1,217,495	1,234,515	17,020	373,369	390,451	17,082
2030	1,224,999	1,242,282	17,283	374,415	391,752	17,337
2031	1,235,561	1,253,181	17,620	376,746	394,410	17,663
<b>2032</b>	1,246,105	1,264,062	17,957	379,072	397,061	17,989
2033	1,245,346	1,263,288	17,942	378,790	396,765	17,975
2034	1,244,588	1,262,515	17,927	378,507	396,468	17,961
2035	1,243,846	1,261,759	17,913	378,231	396,178	17,947
2036	1,243,108	1,261,007	17,899	377,957	395,890	17,933
2037	1,242,366	1,260,251	17,885	377,681	395,600	17,919
2038	1,241,624	1,259,495	17,871	377,405	395,310	17,905
2039	1,240,886	1,258,742	17,856	377,130	395,021	17,891
2040	1,240,144	1,257,986	17,842	376,854	394,731	17,877
2041	1,240,098	1,257,939	17,841	376,837	394,713	17,877
2042	1,240,052	1,257,892	17,840	376,819	394,695	17,876
2043	1,240,005	1,257,845	17,839	376,802	394,677	17,875
2044	1,239,959	1,257,798	17,838	376,785	394,659	17,874
2045	1,239,916	1,257,754	17,838	376,769	394,642	17,873
2046	1,239,870	1,257,707	17,837	376,752	394,624	17,872
2047	1,239,824	1,257,660	17,836	376,735	394,606	17,871

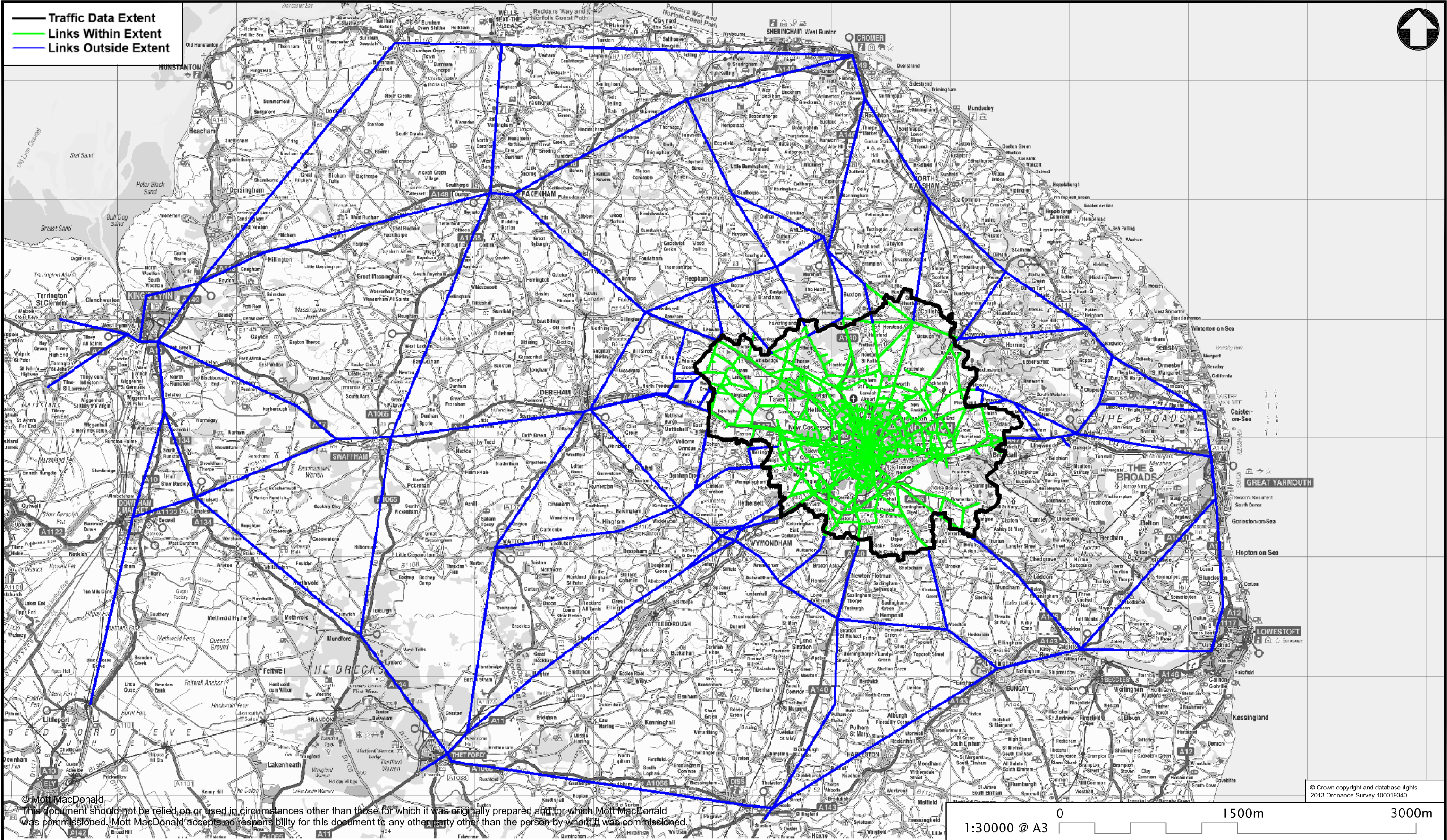
	<b>Wider Network</b>			<b>Fully Modelled Area</b>		
<b>Year</b>	<b>Without Scheme</b>	<b>With Scheme</b>	<b>Change</b>	<b>Without Scheme</b>	<b>With Scheme</b>	<b>Change</b>
2048	1,239,778	1,257,613	17,835	376,718	394,588	17,871
2049	1,239,732	1,257,566	17,834	376,700	394,570	17,870
2050	1,239,686	1,257,519	17,833	376,683	394,552	17,869
2051	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2052	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2053	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2054	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2055	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2056	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2057	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2058	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2059	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2060	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2061	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2062	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2063	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2064	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2065	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2066	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2067	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2068	1,239,633	1,257,465	17,832	376,664	394,532	17,868



	Wider Network			Fully Modelled Area		
Year	Without Scheme	With Scheme	Change	Without Scheme	With Scheme	Change
2069	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2070	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2071	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2072	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2073	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2074	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2075	1,239,633	1,257,465	17,832	376,664	394,532	17,868
2076	1,239,633	1,257,465	17,832	376,664	394,532	17,868

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**B. Drawing MMD-233906-DT-0990: Study Areas Considered in the  
Carbon Assessment**





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				0	11/13	SSJ	Revision for Submission	TE	TE		Checked	TE
										Scale at A3 1:30,000	Approved	TE
										Rev	Status	
										0	INF	